Docket No.: 406788002US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Rykowski et al.

Application No.: 10/653,559 Confirmation No.: 3217

Filed: September 2, 2003 Art Unit: 2629

For: METHOD AND APPARATUS FOR VISUAL DISPLAY CALIBRATION SYSTEM Examiner: R. Amadiz

AMENDED APPEAL BRIEF

MS Appeal Brief—Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notification of Non-Compliant Appeal Brief (37 C.F.R. §41.37), dated March 31, 2008, Applicants submit this Amended Appeal Brief.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.2:

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Radiant Imaging, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 24 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 5, 6, 14, 15, and 27-28
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1-4, 7-13, 16-26, 29, and 30
4. Claims allowed: None
5. Claims rejected: 1-4, 7-13, 16-26, 29, and 30

C. Claims On Appeal

The claims on appeal are claims 1-4, 7-13, 16-26, 29, and 30

IV. STATUS OF AMENDMENTS

Applicant did not file an Amendment after issuance of the Final Office Action mailed on July 24, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Electronic visual display signs have become commonplace in sports stadiums, arenas, and public forums throughout the world. These signs can be in a variety of sizes, ranging from small signs measuring just a few inches per side to stadium scoreboards that measure several hundred square feet in size. (Specification, page 1, lines 13-16.) Electronic visual display signs are assembled and installed using a series

of smaller panels, each of which is itself further comprised of a series of modules. The modules are internally connected to each other by way of a bus system. A computer or central control unit sends graphic information to the different modules, which then display the graphic information as images and text on the sign. (Specification, page 1, lines 17-22.)

Each module in turn is made up of hundreds of individual light-emitting elements, or "pixels." In turn, each pixel is made up of a plurality of light-emitting points termed subpixels (e.g., one red, one green, and one blue). (Specification, page 1, lines 23 – page 2, line 1.) During calibration of each module, the color and brightness of each pixel is adjusted so that the pixels can display a particular color. The adjustment to each pixel necessary to create a color is then stored in software or firmware that controls the module. (Specification, page 2, lines 2-5.)

Although each module is calibrated before leaving the factory, the individual pixels often do not exactly match each other in terms of brightness or color because of manufacturing tolerances. Display manufacturers have tried to remedy this problem by binning subpixels for luminance and color. (Specification, page 2, lines 6-9.) However this practices is both expensive and ineffective. The acute ability of the human eye to detect contrast lines in both luminance and color makes it very difficult to blend two modules that were manufactured with subpixels from different binning lots. (Specification, page 2, lines 10-12.) Furthermore, the electronics powering various modules have tolerances that affect the power and temperature of the subpixels, which in turn affects the color and brightness of the individual subpixels. As the modules age, the light output of each subpixel may degrade. (Specification, page 2, lines 13-16.)

A. Claim 1

Embodiments of the present invention provide methods and apparatuses for measuring and calibrating the output from l visual display signs and modules. (Specification, page 1, lines 8-11.) Independent claim 1, for example, is directed to a method for calibrating a visual display that includes analyzing the visual display module having an array of pixels and corresponding subpixels. (Specification, page 7, lines 15-

26.) The method further includes locating and registering multiple subpixels of the visual display sign, and determining a chromaticity value and a luminance value for each registered subpixel. (Specification, page 9, line 26 – page 10, line 7.) The method further includes converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values. (Specification, page 10, line 26 – page 11, line 3.) The method further includes converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. (Specification, page 11, lines 4-8.) The method then includes calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values. (Specification, page 11, line 9 – page 14, line 22.) The method also includes sending the correction factors to the visual display sign. (Specification, page 15, lines 1-3.)

B. Claim 10

Independent claim 10 is directed to a method for calibrating a visual display. (Specification, page 1, lines 8-11.) The method includes (a) analyzing a portion of a visual display module having an array of pixels and corresponding subpixels. (Specification, page 7, lines 15-26.) The method further includes (b) locating and registering multiple subpixels within the array and (c) determining a chromaticity value and a luminance value for each registered subpixel within the array. (Specification, page 9, line 26 – page 10, line 7.) The method further includes (d) storing the chromaticity and luminance value for each subpixel. (Specification, page 4, lines 1-2.) The method further includes (e) repeating steps (a) to (d) for each portion of the visual display sign until all portions of the visual display sign have been analyzed. (Specification, page 4, lines 2-3.) The method further includes (f) converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values. (Specification, page 10, line 26 – page 11, line 3.) The method also includes (g) converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. (Specification, page 11, lines 4-8.) The method then includes (h) calculating correction factors for each subpixel based on a difference between the measured tristimulus values and the target tristimulus values. (Specification, page 11, line 9 – page 14, line 22.) The method further includes (i)

applying the correction factors to the stored chromaticity and luminance values for each subpixel, and (j) calibrating the visual display sign with the corrected subpixel values. (Specification, page 15, lines 1-3.)

C. Claim 22

Independent claim 22 is directed to an apparatus for analyzing and calibrating a visual display. (Specification, page 3, line 17 – page 5, line 15; Figures 1-3.) The apparatus includes means for capturing an image from a portion of the visual display module positioned within a testing station. (Specification, page 5, line 16 – page 7, line 14; Figures 2 and 3.) The apparatus also includes means for determining a chromaticity and a luminance value for each of a plurality of subpixels from the captured image. (Specification, page 9, line 26 – page 10, line 7.) The apparatus further includes means for converting the chromaticity values and luminance values for each of the subpixels to measured tristimulus values. (Specification, page 10, line 26 – page 11, line 3.) The apparatus also includes means for converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. (Specification, page 11, line 9 – page 14, line 22.) The apparatus further includes means for adjusting the measured tristimulus values for each subpixel to correspond with the target tristimulus values. (Specification, page 4, lines 4-6.)

D. Claim 30

Independent claim 30 is directed to a method for calibrating a visual display module having an array of pixels and corresponding subpixels. (Specification, page 7, lines 15-26.) The method includes locating and registering multiple subpixels of the visual display module with a flat-fielded imaging photometer, and calculating chromaticity coordinates (C_x, C_y) and luminance values (L) for each of the registered subpixels. (Specification, page 9, line 26 – page 10, line 7.) The method also includes converting the chromaticity coordinates and luminance values for each registered subpixel to measured tristimulus values (X_m, Y_m, Z_m). (Specification, page 10, line 26 – page 11, line 3.) The method also includes converting a target chromaticity value and a target luminance value for a given color to target tristimulus values (X_t, Y_t, Z_t). (Specification, page 11, lines 4-8.). The method further includes calculating correction

factors for each registered subpixel based on a difference between the measured tristimulus values (X_m, Y_m, Z_m) and the target tristimulus values (X_t, Y_t, Z_t). (Specification, page 11, line 9 – page 14, line 22.) The correction factor for each registered subpixel includes a three by three matrix of values that indicates some fractional amount of power to turn on each registered subpixel for a given color. (Specification, page 10, lines 8-20.) The method also includes sending the correction factors to the firmware and/or software controlling the visual display sign to calibrate the visual display sign with the adjusted data for each registered subpixel. (Specification, page 15, lines 1-3.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. The Examiner's Rejections

1. The Examiner has rejected claim 30 under 35 U.S.C.§ 112, first paragraph, as allegedly failing to comply with the written description requirement;

2. The Examiner has rejected claims 1, 3, 4, 10, 12, 13, 16, and 29 under 35 U.S.C. § 103(a) over the combination of U.S. Patent No. 6,243,059 to Greene et al. ("Greene") and U.S. Patent No. 6,677,958 to Cottone et al. ("Cottone");

3. The Examiner has rejected claims 2 and 11 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and U.S. Patent No. 6,559,826 to Mendelson et al. ("Mendelson");

4. The Examiner has rejected claims 8, 9 and 20-22 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and U.S. Patent Application Publication No. 2004/0066515 to Ott ("Ott");

5. The Examiner has rejected claims 23 and 24 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Ott, and U.S. Patent Application Publication No. 2004/0179208 to Hsu ("Hsu");

6. The Examiner has rejected claims 7, 17-19, and 31 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and U.S. Patent No. 4,825,201 to Watanabe et al. ("Watanabe");

7. The Examiner has rejected claim 30 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Watanabe, and U.S. Patent No. 5,479,186 to McManus et al. ("McManus"); and

8. The Examiner has rejected claims 25 and 26 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Ott, and Watanabe.

B. The Issues On Appeal

The issues on appeal, and the specific pending claims to which each relates, are as follows:

1. Is the rejection of claim 31 under 35 U.S.C. § 112, first paragraph proper?

2. Is the rejection of claims 1, 3, 4, 10, 12, 13, 16, and 29 under 35 U.S.C. § 103(a) over the combination of Greene and Cottone proper?

3. Is the rejection of claims 2 and 11 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and Mendelson proper?

4. Is the rejection of claims 8, 9 and 20-22 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and Ott proper?

5. Is the rejection of claims 23 and 24 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Ott, and Hsu proper?

6. Is the rejection of claims 7, 17-19, and 31 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, and Watanabe proper?

7. Is the rejection of claim 30 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Watanabe and McManus proper?

8. Is the rejection of claims 25 and 26 under 35 U.S.C. § 103(a) over the combination of Greene, Cottone, Ott, and Watanabe proper?

VII. ARGUMENTS

A. The Section 112 Rejection of Claim 30

Claim 30 stands rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. As explained in detail below, however, the applicants respectfully submit that the Section 112 rejection of claim 30 should be reversed for at least the reasons that: (1) the Examiner has failed to establish a *prima facie* case, and (2) even if the Examiner has established a *prima facie* case, which the applicants expressly do not concede, claim 30 is fully supported by the written description.

1. The Examiner has Failed to Establish a *Prima Facie* Rejection of Claim 30 Under Section 112

The applicants respectfully submit that the Examiner has, by only providing mere conclusory statements, failed to satisfy his burden to articulate a *prima facie* rejection of claim 30 under Section 112. Without adequate notice of the basis of this rejection, the burden to rebut this rejection with evidence and/or argument has not shifted to the applicants. The MPEP repeatedly warns that the Examiner bears an initial burden of establishing a *prima facie* case when making a written description rejection. (*See, e.g.,* MPEP § 2163 (III)(A).) A *prima facie* case requires a reasonable basis to challenge the adequacy of the written description. (MPEP § 2163.04.) The MPEP equates this reasonable basis with "a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims." (MPEP § 2163.04, *citing*, *In re Wertheim*, 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976).)

Consequently, the Examiner must provide a reasonable basis to reject a claim for failing to satisfy the written description requirement, which requires a full development of the reasons showing that, by a preponderance of the evidence, a person of ordinary skill in the art would not recognize a description of the claimed invention in the disclosure. In this regard, the MPEP expressly instructs that merely conclusory statements are insufficient. Rather, every written description rejection "should be stated with a full development of the reasons rather than by a mere conclusion...." (MPEP § 706.03.) Stated differently, the Examiner must adequately explain the perceived shortcomings of the application so that applicant is properly notified and able to respond. Finally, until the Examiner establishes a *prima facie* case, an applicant is not under an obligation to rebut the rejection. (MPEP § 2163.04.) For at least the reasons explained below, the applicants respectfully submit that the Examiner has not established a *prima facie* rejection of claim 30 under Section 112.

In the Final Office Action mailed July 24, 2007 (the "Final Office Action"), the Examiner merely alleges:

> Claim 3[0], recites the term "flat-fielded imaging photometer". This term is not found in the specification. Furthermore, this term is not defined in the specification.

(Final Office Action, p. 2; bracketed information added.) With only these conclusory statements, the Examiner has not established a *prima facie* written description rejection of claim 30. For example, the Examiner has not fully developed and articulated reasons why a person of ordinary skill in the art would not recognize the term "flat-fielded imaging photometer," as recited in claim 30. Rather, the Examiner simply alleges that the claim term is not found or defined in the specification. According to MPEP § 2163, however, there is no *in haec verba* or exact language requirement for support of the claims in the specification. Accordingly, because the Examiner has failed to establish a *prima facie* rejection of claim 30, the burden has not shifted to the applicants to respond to the Section 112 rejection of claim 30.

2. The Section 112 Rejection of Claim 30 is Improper because Claim 30 is Fully Supported by the Written Description

Even assuming for the sake of argument that the Examiner has established a *prima facie* case, which the applicants expressly do not concede, the applicants respectfully disagree with the Examiner's assertion and submit that claim 30 is fully supported by the specification. When a disclosure describes a claimed invention in a manner that permits one skilled in the art to reasonably conclude that the inventor possessed the claimed invention, the written description requirement is satisfied. (MPEP §2163.) This possession may be shown in any number of ways, and an applicant need not describe every claim feature exactly because, as noted above, there is no *in haec verba* requirement. (MPEP § 2163.) Rather, all that is required to satisfy the written description requirement is "reasonable clarity." (MPEP § 2163.02.) Furthermore, an adequate description may be made in any way through express, implicit, or even inherent disclosures in the application, including words, structures, figures, diagrams, and/or formulae. (MPEP §§ 2163(I), 2163.02.)

In the present case, the applicants respectfully submit that the specification supports claim 30 with reasonable clarity by both implicitly and explicitly satisfying the written description requirement. For example, the applicants' specification implicitly satisfies the written description requirement because the applicants' specification is directed to, among other things, imaging devices for on-site visual display calibration systems. (Specification, page 3, lines 22-26.) Those of ordinary skill in the art will understand that a disclosure directed to such imaging devices includes flat-fielded imaging photometers. In addition, the applicants' specification explicitly satisfies the written description requirement because the applicants' disclosure incorporates by reference an article entitled "Digital Imaging Colorimeter for Fast Measurement of Chromaticity Coordinate and Luminance Uniformity of Displays," Jenkins et al., Proc.SPIE Vol. 4295, Flat Panel Display Technology and Display Metrology II, Edward F. Kelley Ed., 2001. ("Jenkins" incorporated by reference on p. 7 of the Specification.) The Jenkins article discloses flat-fielded imaging photometers. (Jenkins, p. 3.) Accordingly, the term "flat-fielded imaging photometer" is fully supported by the written description, and the applicants respectfully submit that persons having ordinary skill in

the art would reasonably conclude that the applicants possessed the claimed invention on the basis of the aforementioned implicit and explicit descriptions.

In view of the foregoing, the applicants respectfully submit that (1) the Examiner has failed to establish a *prima facie* case rejecting claim 30 under Section 112, and (2) even if the Examiner has established a *prima facie* case, which the applicants expressly do not concede, claim 30 is fully supported by the written description. Accordingly, the applicants respectfully submit that the Section 112 rejection of claim 30 should be reversed.

B. The Section 103(a) Rejections of Claims 1, 3-6, 10, 11, 13-15, 18, 22, 23, and 30

1. Legal Requirements for Obviousness

All of the claims on appeal stand rejected under 35 U.S.C. § 103(a), which provides:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

To properly reject claims as obvious, "the examiner bears the initial burden of presenting a *prima facie* case of obviousness." *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d (BNA) 1955, 1956 (Fed. Cir. 1993). To present a *prima facie* case of obviousness, the Examiner must show that "there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. __, 127 S. Ct. 1727 (2007). Relevant considerations may include "interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art." *Id.* The Examiner's analysis "should be made explicit." *Id.* "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated

reasoning with some rational underpinning to support the legal standard of obviousness." *Id.* (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).)

Following the Supreme Court decision in *KSR v. Teleflex*, the USPTO issued a memorandum to all Examiners. The memorandum, a portion of which is presented below, directs Examiners to continue to gain insight from the "teaching, suggestion, motivation" test when determining obviousness:

> [I]n formulating a rejection under 35 U.S.C. 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.

Under these standards, appellant's invention is not obvious. For at least the reasons explained below, the Examiner has failed to satisfy his burden of presenting a *prima facie* case of obviousness because the Examiner has not identified prior art references that disclose all of the elements of the pending claims. For example, several pending claims include, *inter alia*, converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. As explained in greater detail below, Greene, Cottone, Mendelson, Ott, Hsu, Watanabe, and McManus fail to disclose or suggest these features. The Examiner has also not provided an apparent reason or motivation to combine the cited references to produce the claimed invention. Accordingly, the Section 103 rejections should be reversed and the pending claims should be allowed.

C. The Combination of Greene and Cottone Fails to Support a *Prima Facie* Case for Rejecting Claims 1, 3-6, 10, 11, 13-15, 18, 22, 23, and 30 Under Section 103 for at Least the Reason that These References Fail to Teach or Suggest All of the Features of the Claims

Claims 1, 3, 4, 10, 12, 13, 16, and 29 stand finally rejected under 35 U.S.C. § 103(a) over the combination of Greene and Cottone. The stated grounds for rejecting the independent claims 1 and 10 are all predicated on the assertion that it would have been obvious to combine Greene's color correction method with Cottone's method for calibrating a flat panel visual display. As discussed in greater detail below, however,

independent claims 1 and 10 include several features neither taught nor suggested by Greene and Cottone.

1. Independent Claim 1 is Directed to a Method for Calibrating a Visual Display Including, *inter alia*, Converting the Chromaticity and Luminance Values for Each Subpixel to Measured Tristimulus Values for a Given Color, and Calculating Correction Factors for Each Registered Subpixel

As discussed above, independent claim 1 is directed to a method for calibrating a visual display module having an array of pixels and corresponding subpixels. The method includes locating and registering multiple subpixels from the visual display module. The method also includes determining a chromaticity value and a luminance value for each registered subpixel and converting the chromaticity and luminance values for each registered subpixel to measured tristimulus values. The method further includes converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. The method then includes calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values, and sending the correction factors to the visual display module.

Independent claim 10 includes several features generally similar to those of claim 1 (e.g., locating and registering multiple subpixels of the module, determining chromaticity and luminance values for each registered subpixel, converting the chromaticity and luminance values for each subpixel to measured tristimulus values for a given color, and calculating correction factors for each registered subpixel).

2. Greene Discloses a Method and Apparatus for Correcting Spatial Non-Uniformities in Color of Visual Displays

Greene is directed to a method and apparatus for correcting spatial non-uniformities in the color of electronic, flat panel displays caused by variations in materials, manufacturing, and/or operational parameters. Referring to Figure 10 of Greene, this reference discloses an apparatus 32 for testing and calibrating a visual display 34. The apparatus 32 includes an arm 33 with a colorimeter head 35 mounted on the arm 33. The colorimeter head 35 can move in the x- and y-directions to a variety

of different positions relative to the display (as shown by arrows 36 and 38). During testing, selected pixels of the display 34 can be turned on and the colorimeter head 35 can be positioned over the corresponding pixels to scan and measure the color elements and other characteristics of the respective pixels. Color correction parameters can then be computed and stored in a memory of the display 34. (Greene, 17:18-33.)

Greene discloses correcting the variations between chromaticity and luminance between adjacent pixels so that the remaining variation between the adjacent pixels will be below a detection threshold of a human observer. (Greene, 10:35-37.) Greene further discloses that "the chromaticity threshold applies only to adjacent pixels, or to two adjacent groups of pixels having a sharp boundary. For more distant pixels or groups of pixels, gradual luminance variations as large as 10 to 20% may be permissible." (Greene, 10:26-30; emphasis added.) Greene further adds that "an accurate solution is not needed, because the corrections need to reduce chromaticity and luminance nonuniformities only below the detection threshold for the average observer." (Greene, 15:64-66; emphasis added.)

3. Cottone Discloses a Method of Calibrating a Flat Panel Display

Cottone is directed to a method of calibrating a flat panel video display, such as an Organic Light Emitting Diode (OLED) display. The method of Cottone includes three components: (1) calibrating the flat panel display to a desired white point, (2) characterizing the flat panel display for chromaticity and luminance, and (3) providing an image processing path for driving the display. (Cottone, 3:24-28.)

More specifically, Cottone's method includes providing a flat panel OLED display having an overall and individual adjustment for both gain and offset. The method then includes displaying a first target using a low level code value for each channel, sensing the luminance level of the first target, and adjusting the gain of the display so that the sensed luminance level matches a first predetermined aim value representing a luminance level at least three decades lower than a maximum luminance level. (Cottone, 1:54-65 and Figure 2.) The method further includes displaying (a) a second target using intermediate code values for each channel of the display device, and (b) a third target using maximum code values for each channel of the display device. The

luminance and chromaticities of the displayed second and third targets are sensed and compared with a second aim value and a third aim value, respectively. The individual channel gains and offsets are then adjusted so that the luminance level matches the corresponding second and predetermined aim values and the chromaticities match a first set of predetermined chromaticities. (Cottone, 1:66-2:18, and Figure 2.) Cottone discloses that this process is repeated until all three aim values are achieved. (Cottone, 4:30-31.)

4. Greene and Cottone Cannot Support a Section 103 Rejection of Claim 1 Under Section 103 for at Least the Reason that These References Fail to Teach or Suggest All of the Features of the Claimed Method

Independent claim 1 is patentable over Greene and Cottone for at least the reason that these references fail to teach or suggest all of the features of the claimed method. As discussed above, for example, claim 1 recites determining a chromaticity and a luminance value for each registered subpixel, converting the chromaticity and luminance value for each registered subpixel to measured tristimulus values, and calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and target tristimulus values for a given color. Neither Greene nor Cottone teach or suggest these claimed features. Indeed, the Examiner correctly concedes in the Final Office Action that Greene "does not teach converting the chromaticity and luminance value for each registered subpixel value to tristimulus value[s] in step (d)," and that Greene further fails to teach "converting a target chromaticity value and a target luminance value for a given color to tristimulus values in step (e)." (Final Office Action, p. 3; bracketed information added.)

In contrast with the features of claim 1, Greene specifically discloses that the adjustments or corrections made to various pixels or groups of pixels of a flat panel video display are made to match uniformity requirements of the average human observer. Greene further discloses that such adjustments may not be consistent and pixels in one portion of the display may have luminance values that vary as much as 10-20% from luminance values in another portion of the display. In fact, Greene specifically teaches that "an accurate solution is not needed, because the corrections

need to reduce the chromaticity and luminance nonuniformities only below the detection threshold for the average observer." (Greene, 15:63-67; emphasis added.) At best, therefore, Greene discloses that the pixels of a display are adjusted so that they are generally uniform and there are no large differences between adjacent pixels. Nowhere does Greene disclose or suggest the method of claim 1, which requires calculating correction factors for each registered subpixel of the display based on a difference between the measured tristimulus values and the target tristimulus values for a given color. Rather, Greene's pixels are only corrected to be consistent with the immediately adjacent pixels, and are not individually corrected based on a single target value for a given color.

To cure the above-noted deficiencies of Greene, the Examiner relies on Cottone in the Final Office Action. More specifically, the Final Office Action asserts that "it would have been obvious . . . to convert the [Greene's] chromaticity and luminance values into tristimulus values as taught by Cottone . . . so as to increase the precision of color/brightness values." (Final Office Action, pp. 3 and 4; bracketed information added.) Cottone, however fails to cure the above-noted deficiencies of Greene. For example, Cottone is directed to capturing a number of images from an OLED display with the display set to various code values (e.g., low, intermediate, and maximum levels). Nowhere does Cottone disclose or suggest calculating correction factors for each pixel of a display. Instead, based on the undersigned attorney's review of this reference, it appears that Cottone's measurements capture the spectral output of the entire display using a spectral radiometer, and without locating or registering any individual pixels within the OLED display.

The Examiner's proposed combination of Greene and Cottone accordingly fails to meet the basic criteria for defining even a *prima facie* basis for a Section 103 rejection, because these references, individually and/or combined, fail to teach or suggest all of the features of claim 1. Therefore, the Section 103 rejection of claim 1 should be reversed.

5. The Examiner has Failed to Show that There is an Apparent Rational Reason to Combine Greene and Cottone, and Has Thereby Failed to Establish a *Prima Facie* Case of Obviousness

In addition to the requirement that the applied references teach or suggest all the claimed features, the MPEP also states that obviousness is "established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so." (MPEP § 2143.01; emphasis added.) In this regard, the Supreme Court indicated that the Examiner should show that:

> there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue...[and that] rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal standard of obviousness.

KSR, 550 U.S. __. Moreover, in the memorandum issued by the USPTO referenced above, the USPTO has explicitly directed Examiners to "identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed."

In the present case, even assuming that the applied references teach all of the features of claim 1, which the applicants expressly do not concede, the Examiner has still not articulated an apparent reason why a person of ordinary skill in the art would have combined the Greene and Cottone references. Instead, in the Final Office Action, the Examiner relies on his own opinion and simply states:

> [I]t would have been obvious to a person of ordinary skill in the art to convert the chromaticity and luminance values into tristimulus values as taught by Cottone et al. in the method for calibrating a visual display taught by Greene et al. so as to increase the precision of color/brightness values. Furthermore, it is well known that color can be represented in different formats and any known method of defining color/brightness will perform equally well at helping calibrate a display.

(Final Office Action pp. 3 and 4.) Such conclusory opinions do not satisfy the articulated reasoning required by case law and recent USPTO directives. Although the Examiner mentions combining Cottone with Greene "so as to increase the precision of

color/brightness values," the Examiner has not satisfied the obviousness standard. For example, the Examiner has failed to provide any articulated reasoning as to why it would have been obvious to increase the precision of color/brightness values of Greene according to the combined method of Cottone. Moreover, the Examiner simply alleges that any known method of defining color/brightness will perform equally well, without any explanation of how or why this may be the case. In addition, the applied references do not even suggest the desirability of modifying Greene's method to include converting the chromaticity and luminance values for each pixel to measured tristimulus values or calculating correction factors based on a difference between the measured tristimulus values and the target tristimulus values for a given color, as required in claim 1. In fact, as explained in detail below, Greene teaches away from such a modification.

Rather than articulating an apparent rational reason to modify Greene according to Cottone to arrive at the features of claim 1, the Examiner has used the applicants' disclosure as a template to selectively identify various elements from the prior art and put them together without consideration of operability or desirability. The Examiner's rationale appears to be nothing more than a thinly veiled use of impermissible hindsight gleaned from the applicants' specification to provide the desirability of the invention. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-1052 (Fed. Cir. 1988). For at least these reasons, the Examiner has not established a *prima facie* case of obviousness and the combination of Greene and Cottone cannot render independent claim 1 unpatentable. Therefore, the Section 103 rejection of claim 1 should be reversed.

6. Greene and Cottone Cannot Support a Section 103 Rejection of Claim 1 Under Section 103 for at Least the Reason that These References Teach Away from the Claimed Method

Not only has the Examiner failed to provide an apparent rational reason to combine the applied references, these references teach away from the features of claim 1. For example, as mentioned above, Greene specifically emphasizes that "an accurate solution is not needed, because the corrections need to reduce the chromaticity and luminance nonuniformities only below the detection threshold for the average observer." (Greene, 15:63-67; emphasis added.) Greene's disclosure goes

into considerable detail concerning various methods to increase the speed of the calculation process since precision is not necessary. (*See, e.g.*, Greene, 15:63-17:9.) For example, Greene discloses that "fast approximate techniques, including adaptive, neural network, or fuzzy logic-type solutions are possible." (Greene, 15: 67-16:2; emphasis added.) Moreover, Greene discloses various shortcuts that can be used to speed up the calculations since the new values don't have to be precise—they just have to be "below the detection threshold for the average observer." (Greene, 15:64-66.) Furthermore, based on the undersigned's reading of Greene, such precision is outside the scope of Greene and would be far too time-consuming and intensive in light of Greene's teachings. As a result, Greene teaches directly away from the features of claim 1, including converting the chromaticity and luminance values for each subpixel to measured tristimulus values for a given color, and calculating correction factors for each registered subpixel.

Cottone also fails to cure the above-noted deficiencies of Greene. Rather, Cottone appears to only be used in the Final Office Action to support the use of tristimulus values. As explained in detail above, however, Greene teaches directly away from such additional complex calculations because they could increase the time required for processing and provide a much higher level of accuracy than is needed in Greene's method. Thus, a person of ordinary skill in the art would not be motivated to modify Greene's method in light of Cottone to come up with the clamed combination of elements. Therefore, the Section 103 rejection of claim 1 should be reversed.

Claims 3, 4, and 29 depend from base claim 1. Accordingly, the combination of Greene and Cottone cannot support a Section 103 rejection of claims 3, 4, and 29 for at least the reason that these references cannot support a Section 103 rejection of base claim 1, and for the additional features of these dependent claims. Therefore, the Section 103 rejection of dependent claims 3, 4, and 29 should be reversed.

Independent claim 10 includes several features generally similar to those of claim 1 (e.g., converting the chromaticity values and luminance values for the registered subpixels to measured tristimulus values, calculating corrections factors for each registered subpixel based on a difference between the measured tristimulus values and

the target tristimulus values for a given color). Accordingly, claim 10 is allowable over the applied references for at least the reasons discussed above with respect to claim 1, and for the additional features of this independent claim. Therefore, the Section 103 rejection of claim 10 should be reversed.

Claims 12, 13, and 16 depend from base claim 10. Accordingly, the combination of Greene and Cottone cannot support a Section 103 rejection of claims 12, 13, and 16 for at least the reason that these references cannot support a Section 103 rejection of corresponding base claim 10, and for the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 12, 13, and 16 should be reversed.

D. The Section 103(a) Rejections of Claims 2 and 11

Claims 2 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Greene, Cottone, and Mendelson. Claim 2 depends from base claim 1, and claim 11 depends from base claim 10. As discussed above, Greene and Cottone fail to support a Section 103 rejection of base claims 1 and 11. Mendelson is relied on in the Final Office Action for teaching "setting the visual display sign image to the color red, green, blue, and white and calibrating the display after each color is set." (Final Office Action, p. 6.) Even assuming for the sake of argument that this is correct, which the applicants expressly do not concede, Mendelson fails to cure the above-noted deficiencies of Greene and Cottone to support a Section 103 rejection of base claims 1 and 10. For example, Mendelson fails to disclose or suggest converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values, as recited in base claims 1 and 10. Accordingly, dependent claims 2 and 11 are allowable over Greene, Cottone, and Mendelson for at least the reason that these references, either alone or in combination, fail to disclose or suggest the features of base claims 1 and 10, and the additional features of dependent claims 2 and 11. Therefore, the Section 103 rejection of claims 2 and 12 should be reversed.

E. The Section 103(a) Rejections of Claims 8, 9, and 20-22

Claims 8, 9, and 20-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Greene, Cottone, and Ott. Claims 8 and 9 depend from base claim 1, and claims 20 and 21 depend from base claim 10. As discussed above, Greene and Cottone fail to support a Section 103 rejection of base claims 1 and 10. Ott is relied on in the Final Office Action for teaching "a measuring device . . . used to determine pixel-by-pixel measurements." (Final Office Action, p. 8.) Even assuming for the sake of argument that this is correct, which the applicants expressly do not concede, Ott fails to cure the above-noted deficiencies of Greene and Cottone to support a Section 103 rejection of base claims 1 and 10. For example, Ott fails to disclose or suggest converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values, as recited in claims 1 and 10. Accordingly, dependent claims 8, 9, 20, and 21 are allowable over the combination of Greene, Cottone, and Ott for at least the reason that these references, either alone or in combination, fail to disclose or suggest the features of base claims 1 and 10, and the additional features of dependent claims 8, 9, 20, and 21. Therefore, the Section 103 rejection of claims 8, 9, 20, and 21 should be reversed.

Independent claim 22 includes several features generally similar to those of claim 1 (e.g., converting the chromaticity values and luminance values for the registered subpixels to measured tristimulus values, calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values for a given color). Accordingly, claim 22 is allowable over the applied references for at least the reasons discussed above with reference to independent claim 1, and for the additional features of this independent claim. Therefore, the Section 103 rejection of claim 22 should be reversed.

F. The Section 103(a) Rejections of Claims 23 and 24

Claims 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Greene, Cottone, and Hsu. Claims 23 and 24 depend from

base claim 22. Hsu is relied on in the Final Office Action for teaching "an optical sensor . . . composed of a CCD (or CMOS) digital camera." (Final Office Action, p. 9.) Even assuming for the sake of argument that this is correct, which the applicants expressly do not concede, Hsu fails to cure the above-noted deficiencies of Greene and Cottone to support a Section 103 rejection of base claim 22. For example, Hsu fails to disclose or suggest converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values, as recited in claim 22. Accordingly, dependent claims 23 and 24 are allowable over the combination of Greene, Cottone, and Hsu for at least the reason that these references, either alone or in combination, fail to disclose or suggest the features of base claim 22, and the additional features of dependent claims 23 and 24. Therefore, the Section 103 rejection of claims 23 and 24 should be reversed.

G. The Section 103(a) Rejections of Claims 7, 17-19, and 31

Claims 7, 17-19, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Greene and Cottone, and Watanabe. Claim 7 depends from base claim 1, and claims 17-19 depend from base claim 10. Watanabe is relied on in the Final Office Action for teaching "sending the correction factors to the visual display module comprising uploading the corrected subpixel values to firmware and/or software controlling the visual display module," "storing pixel data in a database," and "calculating correction factors using software." (Final Office Action, pp. 9 and 10.) Even assuming for the sake of argument that this is correct, which the applicants expressly do not concede, Watanabe fails to cure the above-noted deficiencies of Greene and Cottone to support a Section 103 rejection of base claims 1 and 10. For example, Watanabe fails to disclose or suggest converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values, as recited in claims 1 and 10. Accordingly, dependent claims 7 and 17-19 are allowable over the combination of Greene, Cottone, and Watanabe for at least the reason that these references, either alone or in combination, fail to disclose or suggest the features of base claims 1 and 10, and the additional features of dependent

claims 7 and 17-19. Therefore, the Section 103 rejection of claims 7 and 17-19 should be reversed.

Claim 31 does not exist. Accordingly, the Section 103 rejection of claim 31 is moot.

H. The Section 103(a) Rejection of Claim 30

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Greene, Cottone, Watanabe, and McManus. Claim 30 includes several features generally similar to those of claim 1 (e.g., locating and registering multiple subpixels of the sign, determining chromaticity and luminance values for each registered subpixel, converting the chromaticity and luminance values for each subpixel to measured tristimulus values for a given color, and calculating correction factors for each registered subpixel). As discussed above, Greene and Cottone fail to support a Section 103 rejection of base claim 1. Greene is further relied on in the Final Office Action for teaching "a flat-fielded imaging photometer locating and registering multiple subpixels," Watanabe is relied on in the Final Office Action for disclosing the features discussed above, and McManus is relied on in the Final Office Action for teaching "correction factors including a three by three matrix of values that indicates some fractional amount of power to turn on each registered subpixel for a given color." (Final Office Action, p. 11.)

Even assuming for the sake of argument that these teachings are correct, which the applicants expressly do not concede, Watanabe and McManus each fail to cure the above-noted deficiencies of Greene and Cottone to support a Section 103 rejection of base claim 23. For example, Watanabe and McManus each fails to disclose or suggest converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values, and/or converting a target chromaticity value and a target luminance value for a given color to target tristimulus values, as recited in claim 1. Accordingly, independent claim 30 is allowable over the combination of Greene, Cottone, Watanabe, and McManus for at least the reason that these references, either alone or in combination, fail to disclose or suggest the features of independent claim 1,

and the additional features of independent claim 30. Therefore, the Section 103 rejection of claim 30 should be reversed.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Claims Appendix A.

IX. EVIDENCE

A copy of all evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the Examiner, is attached hereto as Appendix B.

As Appendix B reflects, no evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the Examiner is being submitted.

X. RELATED PROCEEDINGS

A copy of all related proceedings referenced in Section II above, or copies of decisions in related proceedings, are attached hereto as Appendix C.

As Appendix C reflects, no related proceedings referenced in Section II above, or copies of decisions in related proceedings are being provided.

CONCLUSION

Each of claims 1-4, 7-13, 16-26, 29, and 30 has been improperly rejected, because (a) the Examiner has failed to provide cited references that disclose all of the elements of these claims, and (b) the Examiner has failed to provide any motivation or suggestion to combine the cited references that is not based on hindsight or the applicants' own invention. Accordingly, applicants respectfully request that the rejection of the pending claims be reversed.

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Respectfully submitted,

By 

Cameron B. Pilling
Registration No.: 62,085
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7123 (Fax)
Attorney for Applicant

APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/653,559:

1. A method for calibrating a visual display, the method comprising:

(a) analyzing a visual display module, the module comprising an array of pixels and corresponding subpixels;

(b) locating and registering multiple subpixels of the visual display module;

(c) determining a chromaticity value and a luminance value for each registered subpixel;

(d) converting the chromaticity and luminance value for each registered subpixel value to measured tristimulus values;

(e) converting a target chromaticity value and a target luminance value for a given color to target tristimulus values;

(f) calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values; and

(g) sending the correction factors to the visual display module.

2. The method of claim 1, further comprising:

(h) setting the visual display module image to the color red;

(i) repeating steps (a) to (f); and

(i) repeating steps (h) and (i) with the visual display sign image set to green, blue, and white.

3. The method of claim 1 wherein the subpixels are light-emitting diodes.

4. The method of claim 1 wherein the process in step (c) for determining the chromaticity value and luminance value for each subpixel includes the use of an imaging colorimeter.

5. (Cancelled)

6. (Cancelled)

7. The method of claim 1 wherein the process in step (g) for sending the correction factors to the visual display module comprises uploading the corrected subpixel values to firmware and/or software controlling the visual display module.

8. The method of claim 1 wherein steps (a) to (g) take place within a test station.

9. The method of claim 1 wherein steps (a) to (g) take place in a darkroom.

10. A method for calibrating a visual display, the method comprising:

(a) analyzing a portion of a visual display module, the portion comprising an array of pixels and corresponding subpixels;

(b) locating and registering multiple subpixels within the array

(c) determining a chromaticity value and a luminance value for each registered subpixel within the array;

(d) storing the chromaticity value and the luminance value for each subpixel;

(e) repeating steps (a) to (d) for each portion of the visual display module until all portions of the visual display module have been analyzed;

(f) converting the chromaticity value and luminance value for each registered subpixel to measured tristimulus values;

(g) converting a target chromaticity value and a target luminance value for a given color to target tristimulus values;

(h) calculating correction factors for each subpixel based on a difference between the measured tristimulus values and the target tristimulus values;

(i) applying the correction factors to the stored chromaticity and luminance values for each subpixel; and

(j) calibrating the visual display module with the corrected subpixel values.

11. The method of claim 10, further comprising:

(k) setting the visual display module to project the color red;

(l) repeating steps (a) to (i); and

(m) repeating steps (k) and (l) with the visual display module set to green, blue, and white.

12. The method of claim 10 wherein the subpixels are light-emitting diodes.

13. The method of claim 10 wherein the pixels are pixels of a liquid crystal display (LCD).

14. (Cancelled)

15. (Cancelled)

16. The method of claim 10 wherein the process in step (c) for determining the chromaticity value and luminance value for each registered subpixel includes the use of an imaging colorimeter.

17. The method of claim 10 wherein the process in step (d) for storing the chromaticity value and luminance value for each subpixel comprises storing the data in a database.

18. The method of claim 10 wherein the process in step (h) for calculating correction factors for each subpixel includes processing the data using a computer and software.

19. The method of claim 10 wherein the process in step (j) for calibrating the visual display module further comprises uploading the corrected subpixel values to firmware and/or software controlling the visual display panel.

20. The method of claim 10 wherein steps (a) to (j) take place within a test station.

21. The method of claim 10 wherein steps (a) to (j) take place in a darkroom.

22. An apparatus for analyzing and calibrating a visual display, comprising:

means for capturing an image from a portion of the visual display module positioned within a testing station;

means for determining a chromaticity and a luminance value for each of a plurality of subpixels from the captured image;

means for converting the chromaticity values and luminance values for each of the subpixels to measured tristimulus values;

means for converting a target chromaticity value and a target luminance value for a given color to target tristimulus values; and

means for adjusting the tristimulus values for each subpixel to correspond with the target tristimulus values.

23. The apparatus of claim 22 wherein the means for capturing the image comprises a CCD digital camera and lens.

24. The apparatus of claim 22 wherein the means for capturing the image comprises a CMOS digital camera and lens.

25. The apparatus of claim 22 wherein the means for determining the chromaticity and the luminance values for a plurality of subpixels comprises software loaded in an interface, the interface being operably coupled to both the capturing means and the visual display module.

26. The apparatus of claim 22 wherein the means for adjusting the tristimulus values for each subpixel comprises software for calculating a set of correction factors to

be applied to each subpixel and uploading the correction factors to the visual display module.

27. (Cancelled)

28. (Cancelled)

29. The method of claim 1 wherein sending the correction factors to the visual display module comprises calibrating the module with the adjusted subpixel values.

30. A method for calibrating a visual display module having an array of pixels and corresponding subpixels, the method comprising:

(a) locating and registering multiple subpixels of the visual display module carried by a testing station with a flat-fielded imaging photometer;

(b) calculating chromaticity coordinates (C_x, C_y) and luminance values (L) for each of the registered subpixels;

(c) converting the chromaticity coordinates and luminance values for each registered subpixel to measured tristimulus values (X_m, Y_m, Z_m);

(d) converting a target chromaticity value and a target luminance value for a given color to target tristimulus values (X_t, Y_t, Z_t);

(e) calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values (X_m, Y_m, Z_m) and the target tristimulus values (X_t, Y_t, Z_t), wherein the correction factor for each registered subpixel includes a three by three matrix of values that indicates some fractional amount of power to turn on each registered subpixel for a given color; and

(f) calibrating the visual display module with the adjusted values for each registered subpixel.

APPENDIX B

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

APPENDIX C

No related proceedings are referenced in Section II above, hence copies of decisions in related proceedings are not provided.